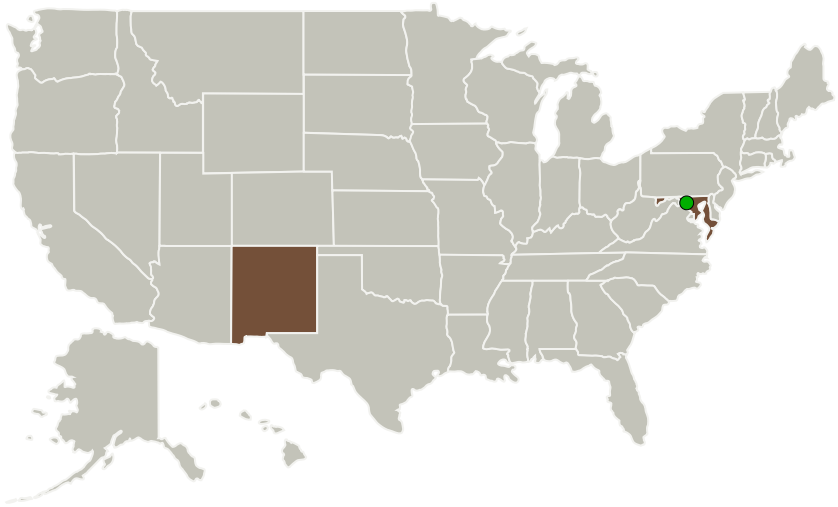
High Accuracy CO2 Instrumentation for UAVs, Phase I

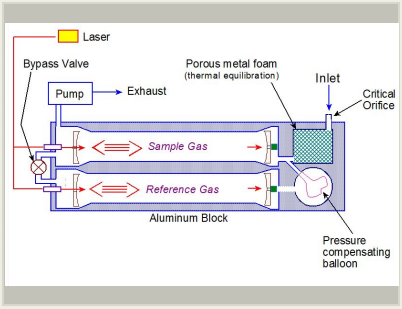
Completed Technology Project (2014 - 2014)

Project Introduction

Over the past decade, the importance of understanding the sources and sinks of carbon dioxide and other greenhouse gases has been recognized. A variety of research studies funded by NASA, DOE and NOAA to measure the fluxes of CO2 from average conditions have been performed. In particular, flux measurements of CO2 in the boundary layer are critical toward understanding the carbon budget for this important greenhouse gas. The World Meteorological Organization has met its goal of 0.1 ppm CO2 accuracy for land based field sensors with gas chromatography and non-dispersive infrared instruments. However, these instruments are poorly suited for UAV use because of their high power requirements, large size and/or weight specifications. This proposal directly addresses NASA's need for high accuracy, UAV-compatible, CO2 instrumentation for their Global Hawk, Sierra, Dragon Eye or other unmanned aircraft. To address the lack of appropriate high accuracy CO2 instrumentation for UAVs, Southwest Sciences proposes to develop a compact, low power, diode laser based instrument designed to achieve dry-air corrected, high accuracy measurements of CO2 . We will target NASA's desired accuracy of 1 ppm CO2 (~1 part in 400) or better in 1 second using absorption spectroscopy in the 2.7 micron CO2 absorption band.

Primary U.S. Work Locations and Key Partners





High Accuracy CO2 Instrumentation for UAVs Project Image

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Organizations Performing Work	Role	Type	Location
Southwest Sciences, Inc.	Lead Organization	Industry	Santa Fe, New Mexico
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Mexico

Project Transitions

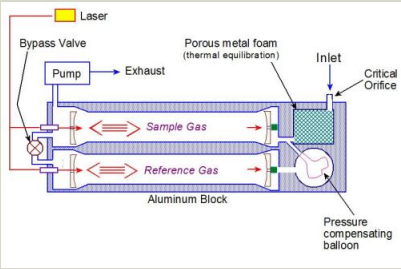
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137780)*

Images



Project Image
High Accuracy CO2 Instrumentation for UAVs Project Image *(https://techport.nasa.gov/image/135498)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Southwest Sciences, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

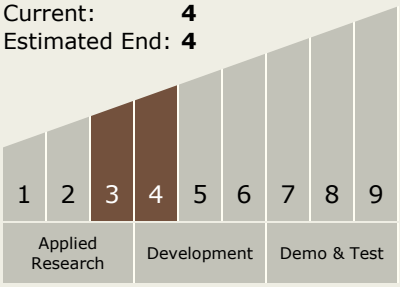
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Anthony M Gomez

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System